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AN EVALUATION OF THE SUITABILITY OF ERTS DATA FOR THE PURPOSES OF
PETROLEUM EXPLORATION

Dr. Robert Collins
Eason Oil Company
5225 Shartel Avenue
Oklahoma City, Oklahoma 73118

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16. Abstract During this 6 month period, we have completed preparations for receipt and interpretation of ERTS data and have examined high altitude photography over the area. Bibliographic work and compilation of existing information are nearly complete. Although we have only recently received four frames of ERTS data peripheral to the principal area of interest we have begun developing and testing various computer, optical and electronic methods of image enhancement and data extraction using digital tapes and 70 mm positive transparencies of ERTS data of other areas.					
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PREFACE

During this 6 month period, we have completed preparations for receipt and interpretation of ERTS data and have examined high altitude photography over the area. Bibliographic work and compilation of existing information are nearly complete. Although we have only recently received four frames of ERTS data peripheral to the principal area of interest, we have begun developing and testing various computer, optical and electronic methods of image enhancement and data extraction using digital tapes and 70 mm positive transparencies of ERTS data of other areas.

INTRODUCTION

This Type II report covering the period June through November 1972, discusses the progress made during the last six months and the activities anticipated for the next two months. During this period, we have completed preparations for receipt and interpretation of ERTS data and have examined high altitude photography over the area. Bibliographic work and compilation of existing information are nearly complete. Although we have not yet received usable ERTS data over most of the area, we have begun developing and testing various computer, optical and electronic methods of image enhancement and data extraction using digital tapes and 70 mm positive transparencies of ERTS data of other areas.

Progress to Date and Current Status of the Experiment

All arrangements for receipt and interpretation of ERTS imagery have been completed. All the equipment that we anticipate as being necessary for this work is on hand.

In mid-August, the NASA RB57 flew three flight lines across the axis of the Anadarko Basin obtaining multispectral black and white photography duplicating as nearly as possible the MSS bands as well as color and false color infrared imagery. Examination of this imagery indicates that MSS band 4 will be somewhat less useful than the other MSS bands for single band interpretation and that false color infrared color composites will be extremely useful for interpreting lithologic and structural features. Both of these preliminary judgments need to be tested once ERTS imagery arrives. This is particularly true because we have requested ERTS imagery

for the snow free times of the spring and fall, whereas the photography was taken during the summer. During preliminary examination of the photography, we may have found some structural features that do not appear on the state geologic map. These features require further checking in that they may appear on maps more recent or more detailed than the state geologic map. It is also possible that field checking may reveal that the features seen are not structural features.

Gathering of bibliographic material is complete and detailed review of this material is well underway. Existing geologic and geophysical information is being compiled as a series of six working overlays to the USGS 1:250,000 1°x2° quadrangles of the area. These overlays show known structural features and structural contours on two early and two late Paleozoic stratigraphic units, magnetic contours, and oil and gas fields. Preparation of overlays is nearly complete. These overlays will be used in the analysis of interpretations made of the ERTS imagery. We are awaiting arrival of usable ERTS coverage of the test site to decide precisely what combination of overlays will be the most helpful and relevant for final analysis of ERTS imagery.

Based on a review of the literature and discussions among our geologists, we have selected a series of structural and stratigraphic features known to control the accumulation of hydrocarbons upon which to test the ability of ERTS imagery to "detect" or "recognize" various types of features. Following this "recognition test" we will analyze the imagery for features not previously known to the interpreter.

We requested ERTS coverage during snow free periods of the spring and fall. Due to unusually cloudy conditions over the test area this fall, relatively little cloud free imagery has been acquired and consequently (as of 1 December) we have received only a few frames of ERTS imagery. All four of these frames are peripheral to the primary areas of interest in the test area. We understand that the test area was relatively clear during the most recent overpasses which occurred during late November and early December. We eagerly look forward to receiving this imagery, especially if it is of the quality we anticipate.

Using digital tapes and 70 mm transparencies of ERTS imagery of other areas (Monteray Bay, Washington, D. C., Arizona, etc.), we have begun developing, testing and refining various computer, optical and electronic techniques of image enhancement. At present, additive color viewing seems to offer a quick method of selectively enhancing geologic features. However, our work to date indicates that successful enhancement techniques are very much area specific. That is, what is successful in one area may fail in others. We look forward to testing these enhancement techniques on imagery of the test site.

Progress Anticipated During the Next Reporting Period

We anticipate that the major event during the next two months will be the beginning of analysis of ERTS imagery of the test site. Assuming timely delivery of the imagery, we will complete the first-look analysis of the imagery and the "recognition test" phase of the continuing analysis of the fall acquired imagery. We will begin plotting features to the overlays we have already prepared. This should yield several tangible reportable results for the next reporting period.

Experience with the ERTS imagery we have to date indicates that at a minimum, this imagery will give petroleum geologists a desirable new perspective on familiar geologic features.

TYPE II PROGRESS REPORT ERTS EXPERIMENT

An Evaluation of the Suitability of ERTS Data
for the Purposes of Petroleum Exploration

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Distribution:

Mr. Robert F. Warren
ERTS Contracting Officer
Code 245
Goddard Space Flight Center
Greenbelt, Maryland 20771

Mr. Richard Stonesifer
Technical Officer
Code 430
Goddard Space Flight Center
Greenbelt, Maryland 20771

Dr. William Nordberg
Project Scientist
Code 650
Goddard Space Flight Center
Greenbelt, Maryland 20771

Mr. Herbert Blodgett
Scientific Monitor
Code 650
Goddard Space Flight Center
Greenbelt, Maryland 20771

Mr. Wilfred Scull
ERTS Project Manager
Code ER
NASA Headquarters
Washington, D. C. 20546

NASA Scientific and Technical
Information Facility
P. O. Box 33
College Park, Maryland 20740